

Amendments to the Specification:

Please amend paragraph no. [0025] on page 7 of the specification to read

[0025] Figure 1A is an x-ray diffraction ~~and micrograph~~ pattern of mesoporous particles made with ethanol as a cosolvent;

Please amend paragraph no. [0026] on page 7 of the specification to read

[0026] Figure 1B is an x-ray diffraction ~~micrograph~~ pattern of mesoporous particles made with methanol as a cosolvent;

Please amend paragraph no. [0029] on page 7 of the specification to read

[0029] The present invention is directed to mesoporous materials and to methods for preparing ~~sub-nanometer~~ sub-micrometer sized silica and silica-based mesoporous materials. The surface of the particles have an intrinsic acidic property. In one embodiment, the particles have a spherical morphology and an inner structure consisting of a nanotube structure with pores oriented along the radius of the spherical particles. The spherical particles have a very high surface area.

Please amend paragraph no. [0034] on pages 9-10 of the specification to read

[0034] The mesoporous particles of the invention are obtained from an aqueous reaction mixture containing a silica source, an organic cosolvent, a surfactant and a silica hydrolysis catalyst in amounts to form a gel. The resulting gel is dried to remove the water and the cosolvent to form a dried product. The dried product is then calcined to form the mesoporous particles. The silica source can be silica, a silica metal oxide complex or an organosilicate and mixtures thereof. The silica hydrolysis catalyst can be any suitable catalyst that is

capable of hydrolyzing silica precursors and forming a gel. Typically, the catalyst is ammonium hydroxide. The cosolvent is preferably an organic cosolvent that is miscible in water. In one embodiment the cosolvent is selected from the group consisting of methanol, ethanol, propanol, butanol and acetone. In further embodiments, the cosolvent is a lower alkyl ketone where the alkyl group has 1-3 carbon atoms.

Please amend paragraph no. [0040] on page 12 of the specification to read

[0040] According to another embodiment of the present invention, a method is provided for preparing mesoporous materials with particular inner structures and properties useful for applications in catalysis, adsorption and separation technologies. The mesoporous materials are produced from aqueous solutions of a surfactant such as hexadecyltrimethyl-ammonium bromide, silica and alumina, gallia and ~~lanthania~~ lanthana precursors and short-chain lower alcohols and an active agent or catalyst for promoting the hydrolysis and condensation of the silica compound and for controlling the pH of the aqueous mother solution. Suitable short chain lower alcohols include ethanol and propanol as the cosolvent. The general procedure uses a liquid handling robot for scanning the compositional coordinates using compositional libraries comprising the variation of the surfactant to lower alcohol ratio. Afterwards, the synthesis was scaled up and reproduced satisfactorily by conventional methods following a sequence comprising: (a) the formation of a homogeneous aqueous solution of the components to form a gel, (b) aging of the gels formed by the interaction of the organic and inorganic species in the aqueous solution, (c) drying the gel under mild conditions of temperature and pressure, and (d) calcining at high temperature. In one preferred embodiment, the calcining includes an initial step in an inert atmosphere and then a second calcining step in air.

Please amend paragraph no. [0051] on pages 17-18 of the specification to read

[0051] The effect of the cosolvent and the molar ratio of the surfactant to the cosolvent were determined by experimentation. Several mesoporous particles were prepared and examined where the molar ratio of surfactant to cosolvent and the ratio of the surfactant to the hydrolysis catalyst were varied as shown in Table 1. Each mesoporous particle was prepared from an aqueous media containing the surfactant cetyltrimethylammonium bromide (CTAB, CAS 57.09.3 obtained from Aldrich Chemical Co.) in demineralized water and an organic cosolvent Tetraethylorthosilicate (TEOS, $\text{SiO}[\text{C}_2\text{H}_5\text{OH}]_4$, CAS 1336.24.6, Aldrich Chemical Co) as a silica source was combined with the aqueous media. Ammonium hydroxide was added as the hydrolysis catalyst (NH_4OH , CAS 1336.21.6, Aldrich Chemical Co.) and as a pH adjusting agent for the aqueous media. In a preferred embodiment, the reaction is carried out at room temperature. The ratio of the surfactant and silica source can be varied to attain the desired shape, size and structure of the mesoporous particles. In one embodiment, the aqueous media contains about 4.5 wt% of a surfactant and a molar ratio of the surfactant to silica source of ~~0.4:1~~ 4.0:1 at a pH 11.5.

Please amend Table 1 in paragraph no. [0053] on pages 18-19 of the specification to read

[0053] Table 1 represents a 6x8 library of the 48 silica mesoporous particles obtained. The specific samples are designated Sxy where x is an integer from 1-6 corresponding to the surfactant to hydrolysis catalyst ratio indicated in Table 1, and y is an integer from 1-8 corresponding to the surfactant/cosolvent ratio indicated in Table 1.

Table 1
Composition Library (S_{xy} positions) design for the synthesis of
Silica based mesoporous materials

		x					
4.5% wt. CTAB		CTAB/NH ₄ OH (molar ratio)					
CTAB / TEOS = 4		1	2	3	4	5	6
(molar ratio)		0.091	0.085	0.080	0.076	0.072	0.068
<u>CTAB</u> Co-Solv. (molar ratio)	0.023						
	0.016		S2,2		S4,2		S6,2
	0.013						
	0.010		S2,4		S4,4		S6,4
	0.009						
	0.008		S2,6		S4,6		S6,6
	0.007						
	0.006		S2,8		S4,8		S6,8

Please amend paragraph no. [0067] on page 26 of the specification to read

[0067] The molar ratio of the surfactant to cosolvent was about 0.0076:1 and the molar ratio of surfactant to hydrolysis catalyst was about ~~0.026~~ 0.076. This composition corresponded to about the position of S₄₆ of Table 1.

Please amend paragraph no. [0076] on page 28 of the specification to read

[0076] The calcined product proved to have a surface area of 855 m²/g, a pore volume of 0.73 ml/g, and a mean pore diameter of ~~35.6~~ 3.56 nm. The x-ray defraction profile is illustrated by Fig. 1A. The particle shape and inner structure are similar to Fig. 2. The resulting mesoporous spherical particle had pores extending radially outward from the center of the particles.